# Zen of Data

Data Boot Camp

Lesson 1.1


WELCOME

# Introductions!

Who are you? (How should we refer to you?)

What you do & what led you to the Data Boot Camp?

What is something you accomplished or are proud of having done this year?

# Garrett Eichhorn

Teaching Assistant (TA)

Bachelor’s Degree from Macalester College

- Computer Science
- Environmental Studies

Data Scientist @ ThreeBridge Solutions

- Specialty within Life Sciences / Med Device
- Design / implement algorithms, predictive models

About Me:

- Washington, D.C native
- Former college football player

# Nili Waypa

## Teaching Assistant (TA)

From Owatonna, MN

Undergrad in MIS and Entrepreneurship from the U of M

Internship at Salesforce in San Francisco

Right out of school: voice games on Alexa

After that: first data analyst at a startup, Sezzle. Now a Data Scientist

In my free time I enjoy drinking beer and running, but not together. Also, traveling.

# Dominic LaBella

## Tuesday/Thursday Instructor

Bachelor’s degree in Computer Engineering

Master’s degree in Quantitative Finance

Most of my early career was spent designing software for medical devices

Later career spent analyzing data and designing mathematical models for banks and hedge funds (esp. mortgages)

Once quit my job as a medical device engineer to produce music in Los Angeles recording studios

# Instructor.Name = “Paul Kaefer”

Instructor.Preferred_Pronouns = [“he”, “him”, “his”]

## Your Instructor

Currently **Senior Analytics Engineer** at Carrot Health (~6 months)

Formerly **Data Scientist II** at UnitedHealthcare (3 years)

Previously…

M.S. in Computational Sciences

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For fun:

Travel (Ireland this past summer)

Reading, editing Wikipedia, volunteer work

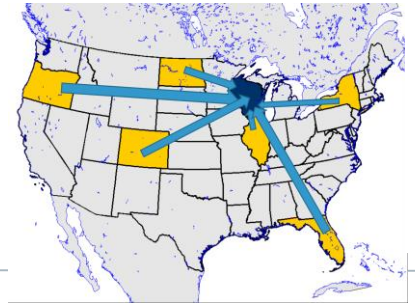
# What have I done?

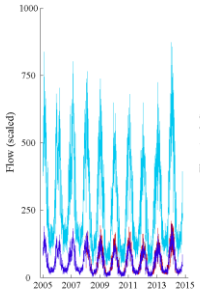
**Languages**: Python, R, Excel, SAS, SQL, MATLAB, Java, …
**Other tools**: Tableau, Linux/scripting

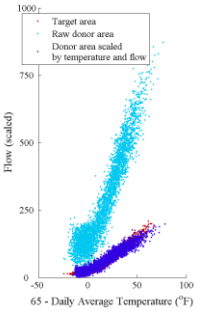
**Carrot Health**
* Mix of modeling, dashboard development, and automating {data processing, model generation, customer deliverables}

**UnitedHealthcare**
* Mostly ETL for Fin360 financial data warehouse & analytics platform
* lots of code to automate data intake, processing, and report generation

**Master's thesis**
* What do you do if you don't have enough data?
* Surrogate/analogous data!





# The Rise of Data

Why is **data analytics** such a **hot** skill these days?

1

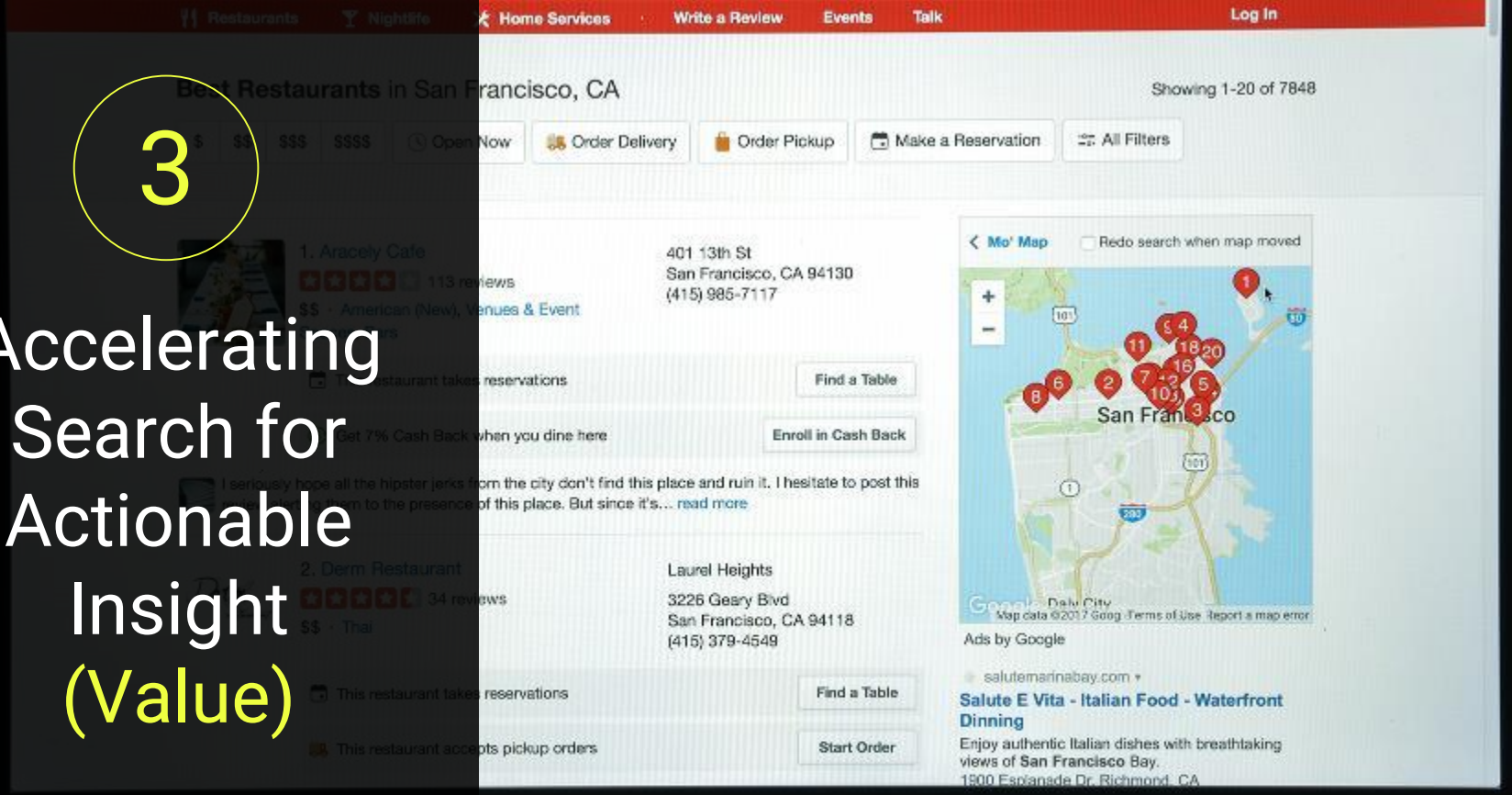
# Explosive Growth in Digitized Data (Creation)

2

# Explosive Growth in Analytic Tools (Synthesis)

3

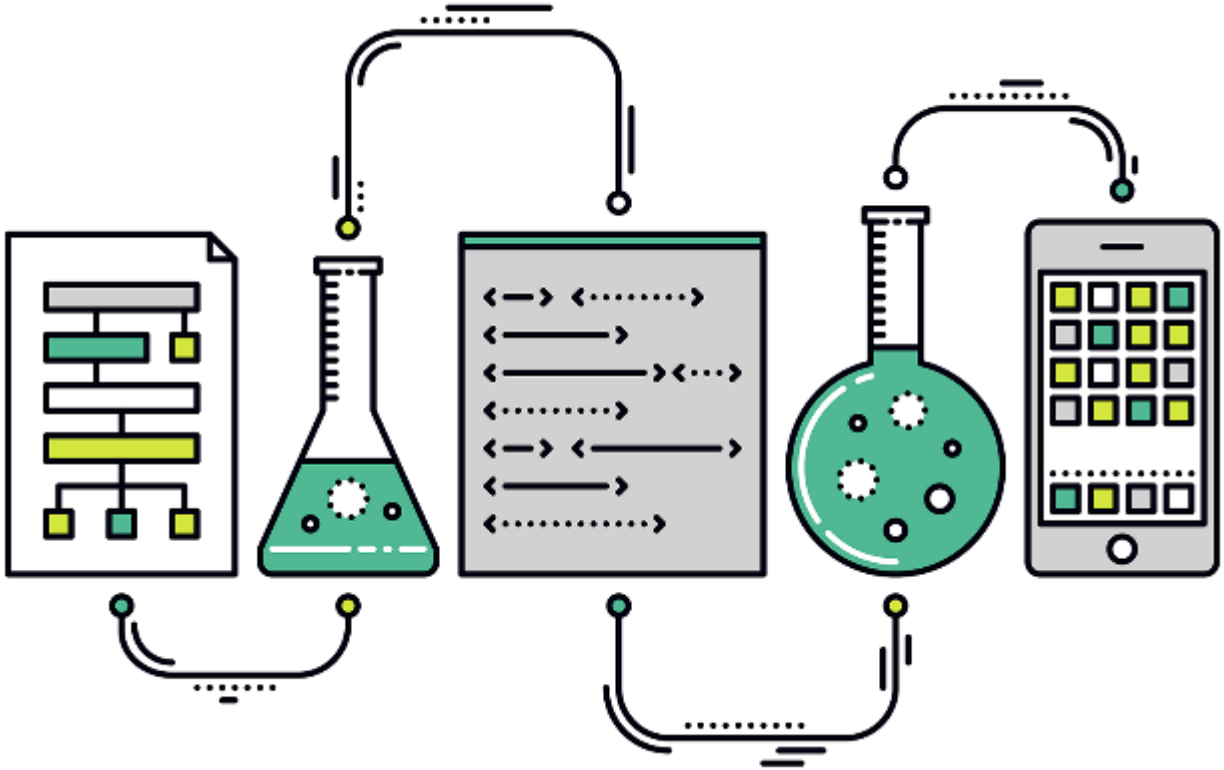
# Accelerating Search for Actionable Insight (Value)



# What does the term **data** mean?

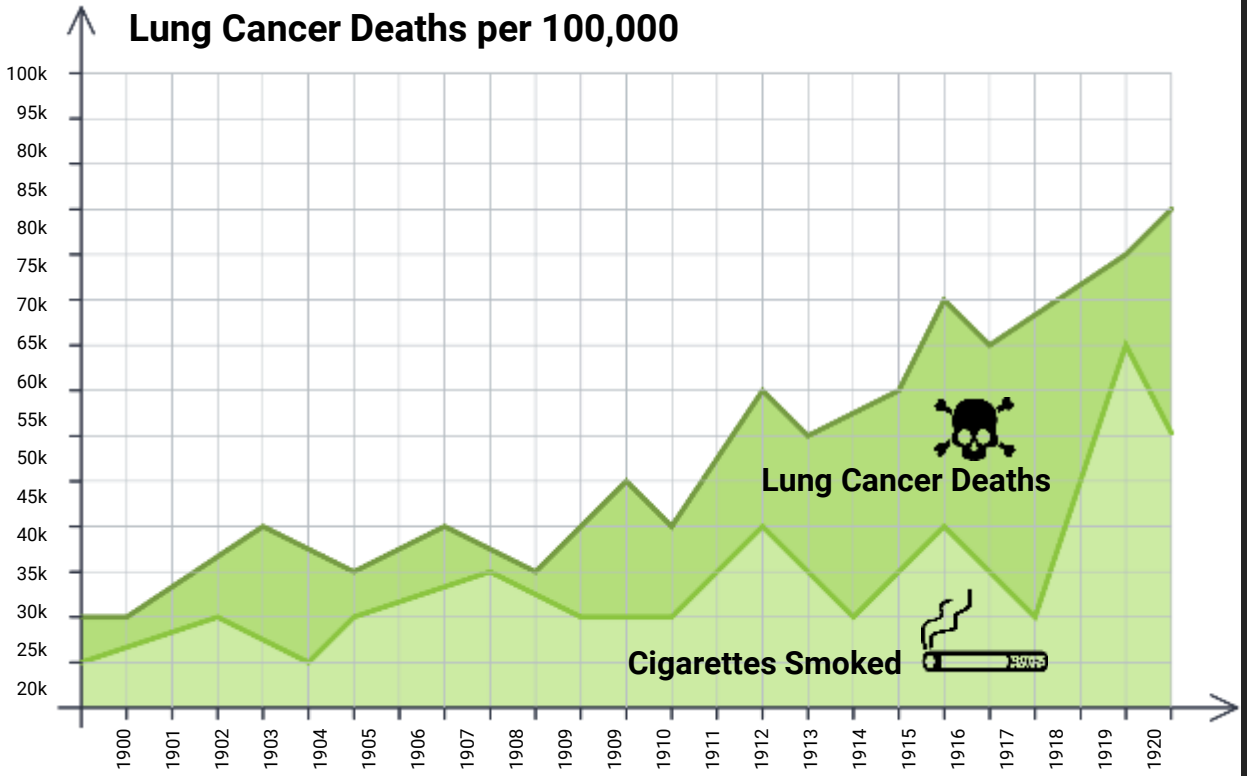
Perhaps you are picturing an Excel spreadsheet.

# Data Science Involves Spreadsheets and Formulas



Fundamentally, data science is about **storytelling** and **truth-telling.**

# Data as Truth-Telling



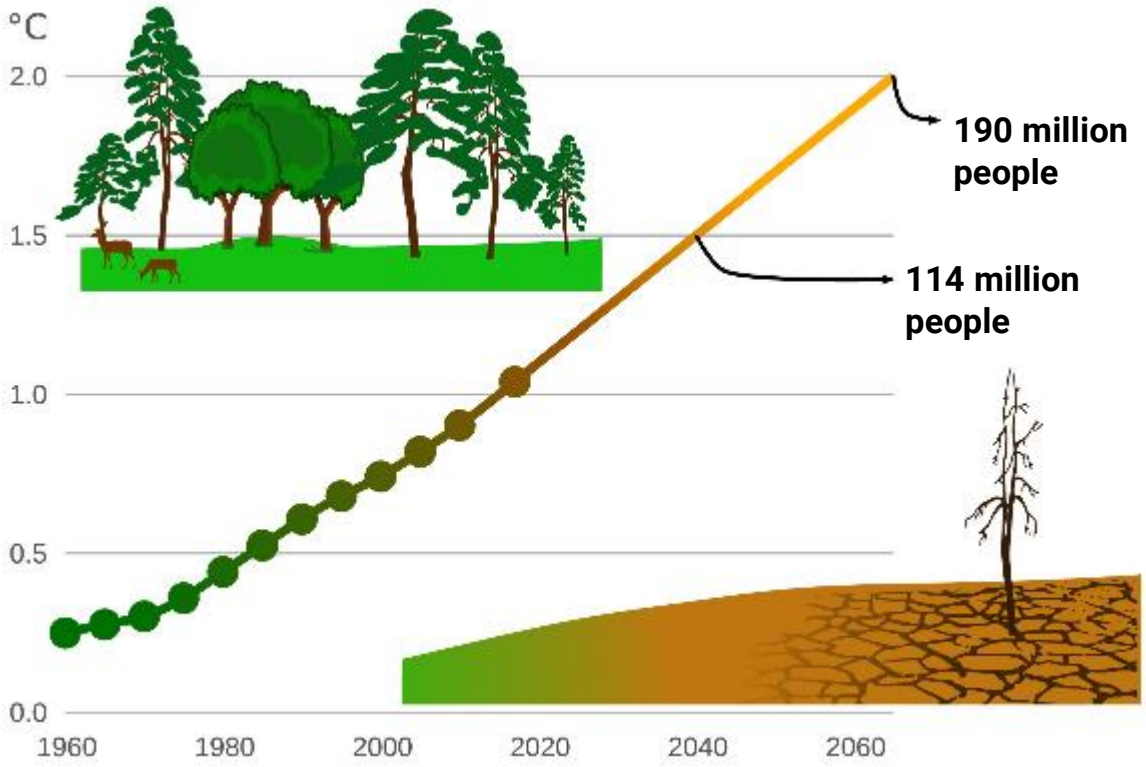

# Data as Truth-Telling

## Unearthing Relationships


# Data as Truth-Telling

## Making Predictions

## Exposure to Extreme Drought Is Increasing




# Data as Truth-Telling

## Stating Significance

# Data as Storytelling

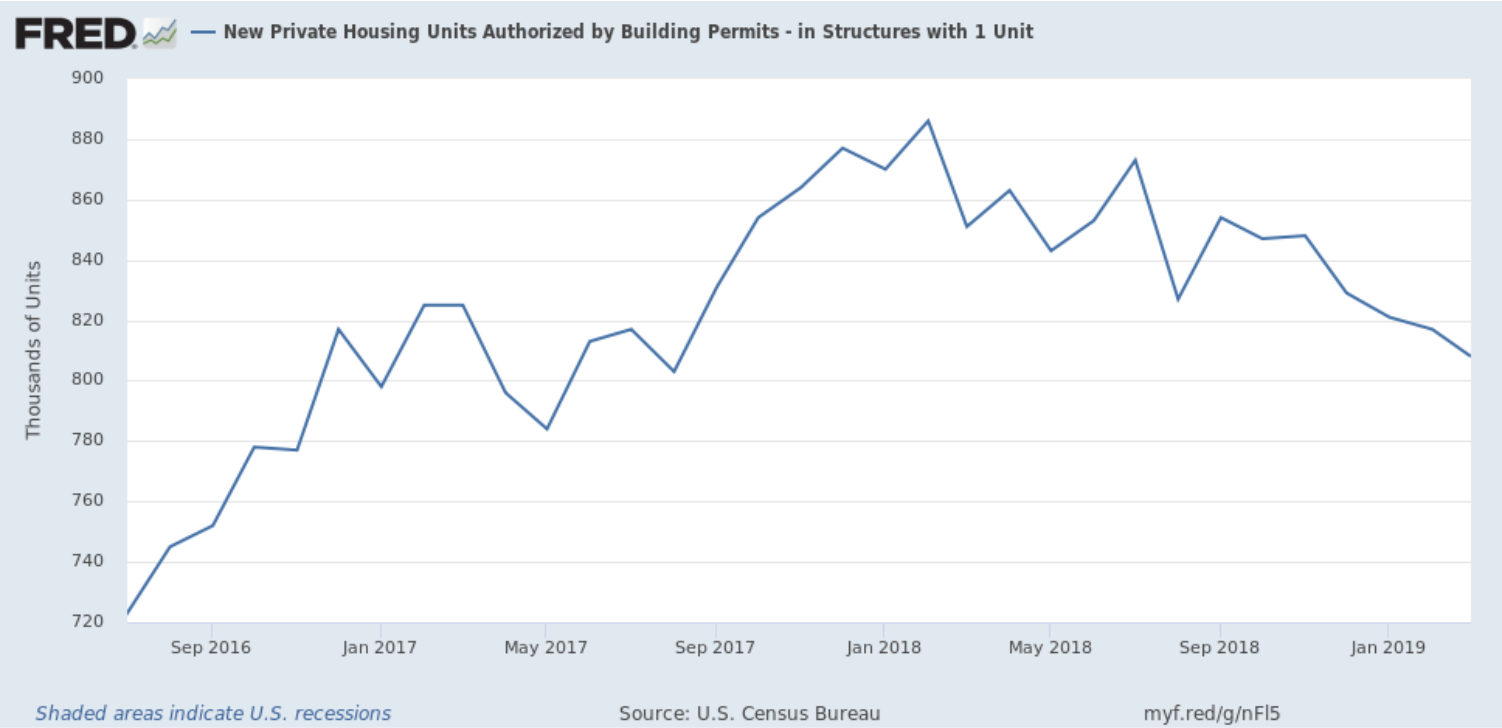
# Data as Storytelling

| U.S. Debt as Percentage of Gross Domestic Product, 1790–2011 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1790 | 29,6% | 1835 | 0.0 | 1880 | 18.4 | 1925 | 21.6 | The Great Depression & World War II | 1970 | 28.0 | Reagan Tax Cuts |
| 1791 | 29.2 | 1836 | 0,0 | 1881 | 16.8 | 1926 | 19.0 | | 1971 | 28.1 | |
| 1792 | 28.0 | 1837 | 0.2 | 1882 | 14.3 | 1927 | 18.0 | | 1972 | 27.4 | |
| 1793 | 24.4 | 1838 | 0.6 | 1883 | 13.5 | 1928 | 17.0 | | 1973 | 26.0 | |
| 1794 | 21.8 | 1839 | 0.2 | 1884 | 13.3 | 1929 | 14.9 | | 1974 | 23.9 | |
| 1795 | 18.7 | 1840 | 0.3 | 1885 | 13.2 | 1930 | 16.5 | | 1975 | 25.3 | |
| 1796 | 16.4 | 1841 | 0.8 | 1886 | 12.4 | 1931 | 22.3 | | 1976 | 27.5 | |
| 1797 | 16.5 | 1842 | 1.2 | 1887 | 11.2 | 1932 | 34.5 | | 1977 | 27.8 | |
| 1798 | 16.0 | 1843 | 1.5 | 1888 | 10.2 | 1933 | 39.1 | | 1978 | 27.4 | |
| 1799 | 15.8 | 1844 | 1.0 | 1889 | 8.6 | 1934 | 44.0 | | 1979 | 25.6 | |
| 1800 | 15.1 | 1845 | 0.7 | 1890 | 7.8 | 1935 | 42.9 | | 1980 | 26.1 | |
| 1801 | 13.3 | 1846 | 1.2 | 1891 | 7.0 | 1936 | 43.0 | | 1981 | 25.8 | |
| 1802 | 13.9 | 1847 | 1.7 | 1892 | 6.6 | 1937 | 40.1 | | 1982 | 28.7 | |
| 1803 | 14.1 | 1848 | 2.2 | 1893 | 6.8 | 1938 | 42.8 | | 1983 | 33.1 | |
| 1804 | 13.2 | 1849 | 2.5 | 1894 | 7.9 | 1939 | 43.0 | | 1984 | 34.0 | |
| 1805 | 10.9 | 1850 | 2.3 | 1895 | 7.9 | 1940 | 42.7 | | 1985 | 26.4 | |
| 1806 | 10.0 | 1851 | 2.4 | 1896 | 8.5 | 1941 | 43.3 | | 1986 | 38.5 | |

Data: Congressional Budget Office

# Data = Drama

## New Housing Construction: Making A Bottom, At Close To Recessionary Levels



# Course Overview

# Tools for Truths, Skills for Stories:

## Our Goals:

Truth-telling

Storytelling

## Our Means:

Microsoft Excel
Python
pandas
Matplotlib/Seaborn
APIs
Beautiful Soup
Machine Learning
R

SQL
MongoDB
HTML/CSS
JavaScript
D3.js
Leaflet.js/Google Maps
Tableau
Hadoop

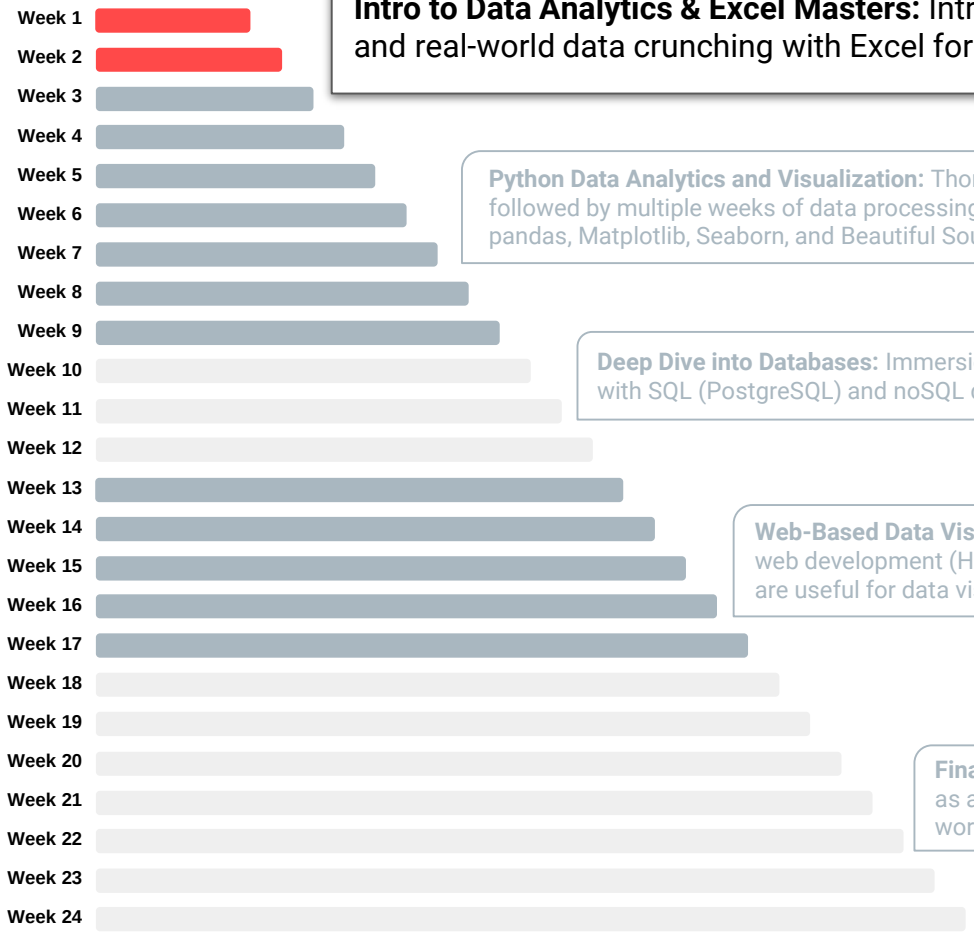
# Course Overview

Each class will include the following:

- Overview of Lesson Topics
- Instructor Lecture
- Instructor Demonstration
- Class Discussions
- In-Class Activities
- Project Work

# Weekly Breakdown by Subject

# Weeks 1–2

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**Python Data Analytics and Visualization:** Thorough crash course on Python programming, followed by multiple weeks of data processing using advanced libraries like NumPy, pandas, Matplotlib, Seaborn, and Beautiful Soup.

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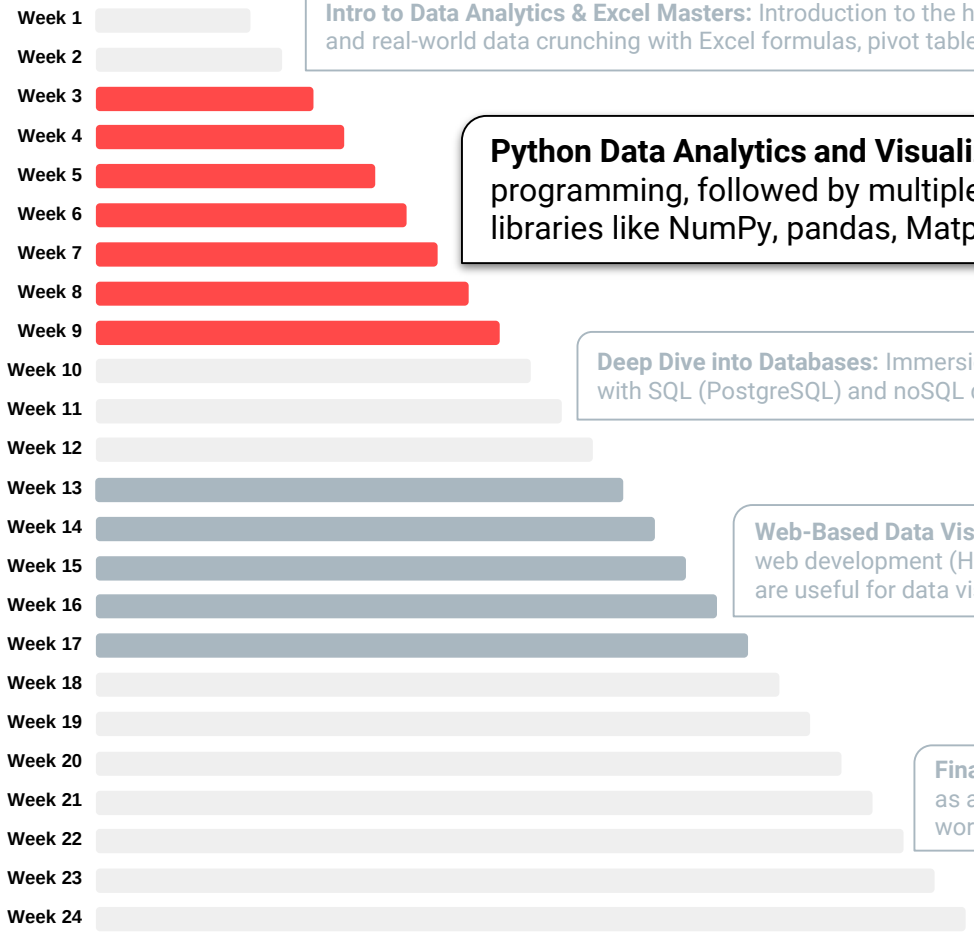
# Weeks 3–9

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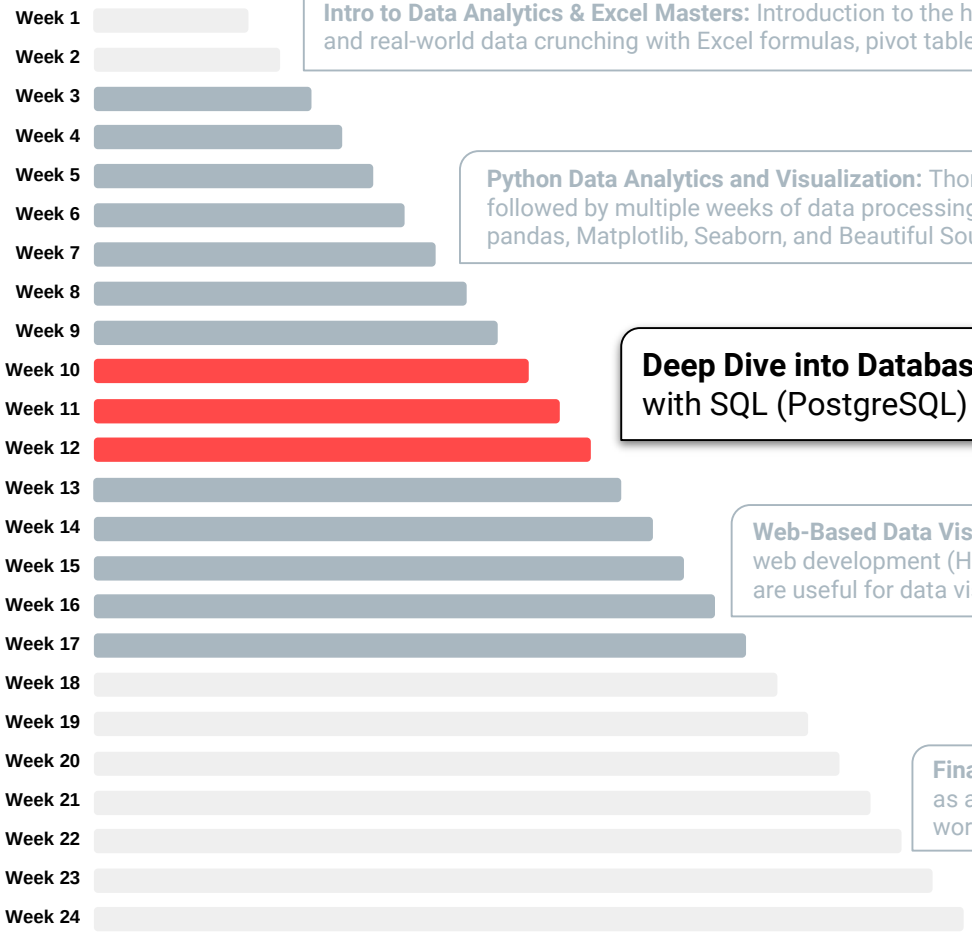
# Weeks 10–12

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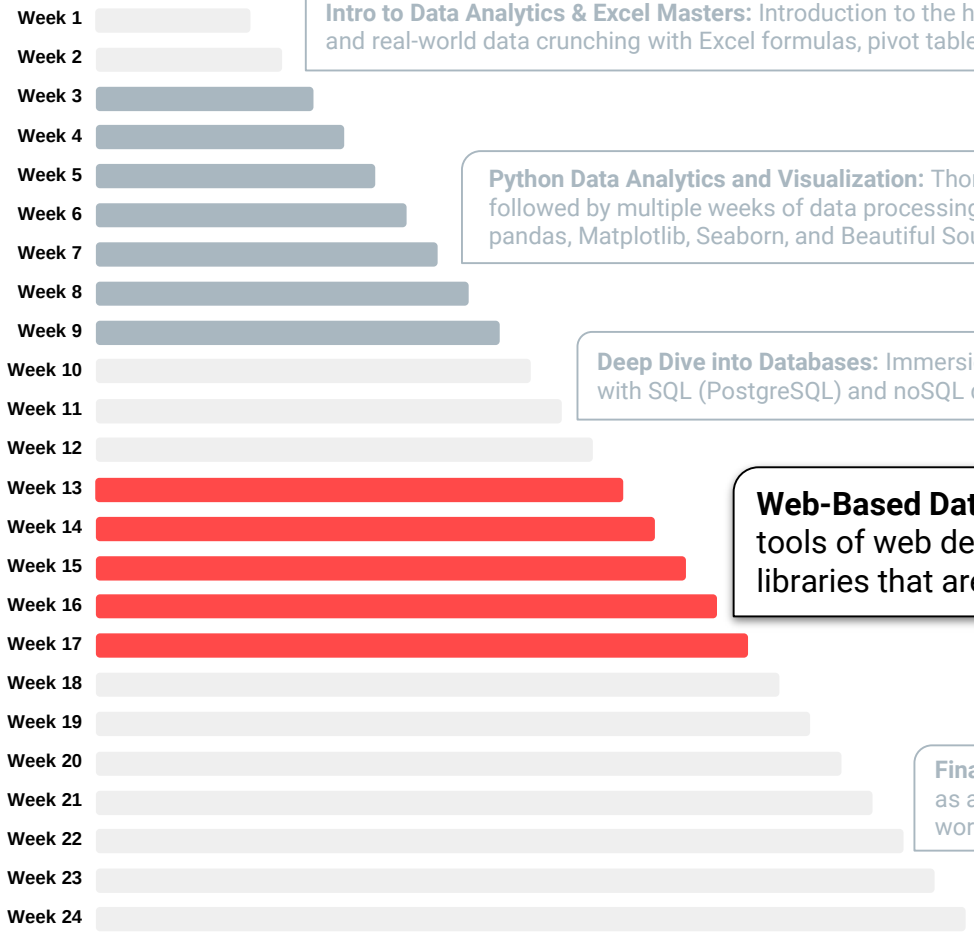
# Weeks 13–17

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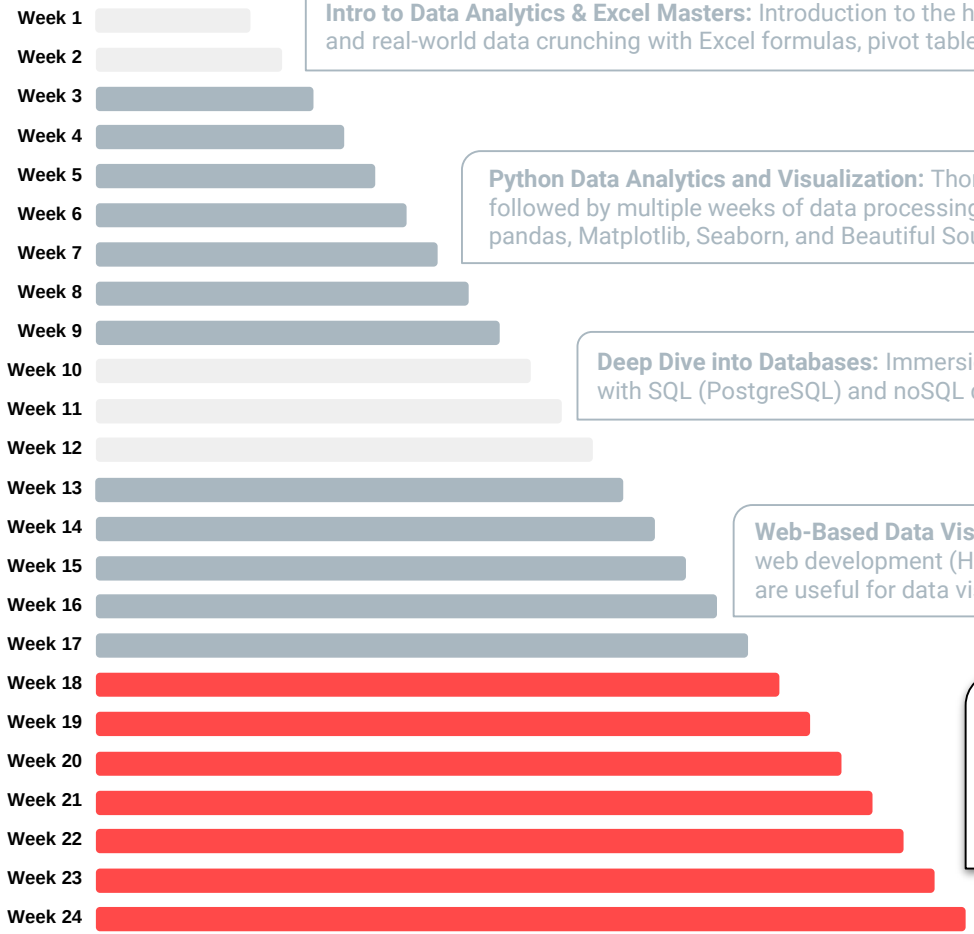
# Weeks 18–24

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# Example Activities

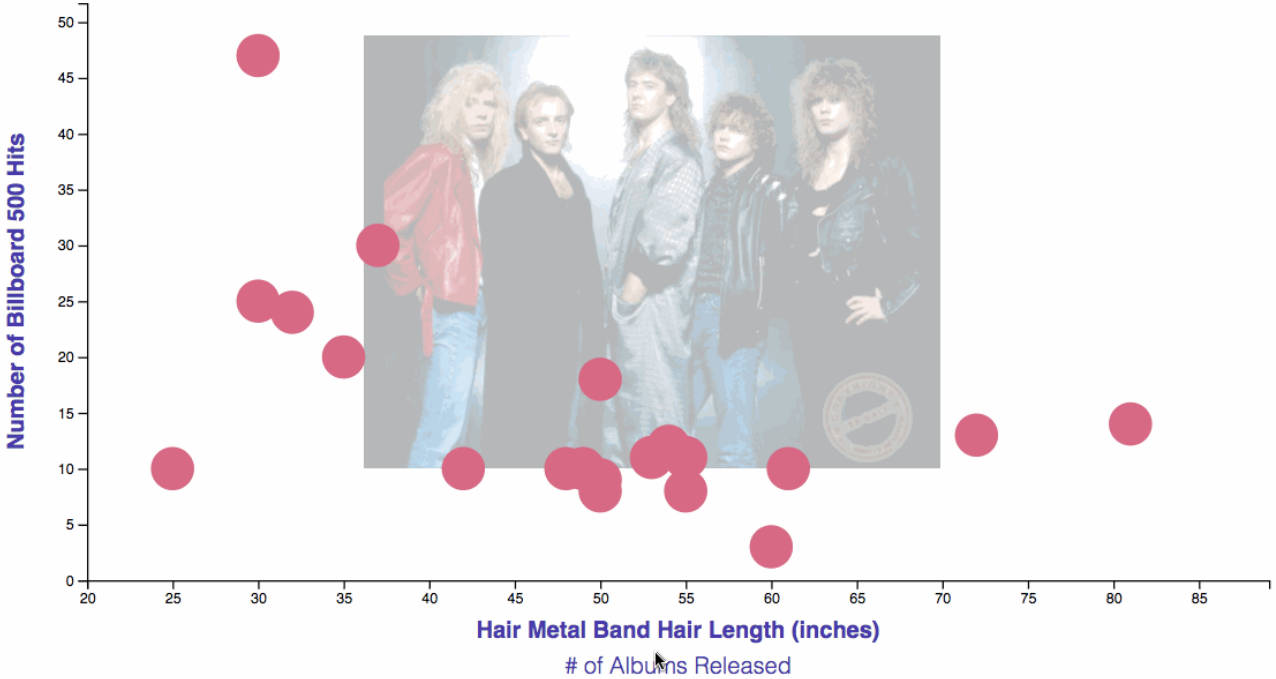
# **Example Activity:** Banking Deserts

In this activity, you will use a variety of public demographic data and APIs to explain many real-world social phenomena. Utilize data from sources like the U.S. Census, Google Maps, and more to find insights on poverty, discrimination, and the impact of changing economies.

**Suggested Time:**
20 minutes

# Example Activity:

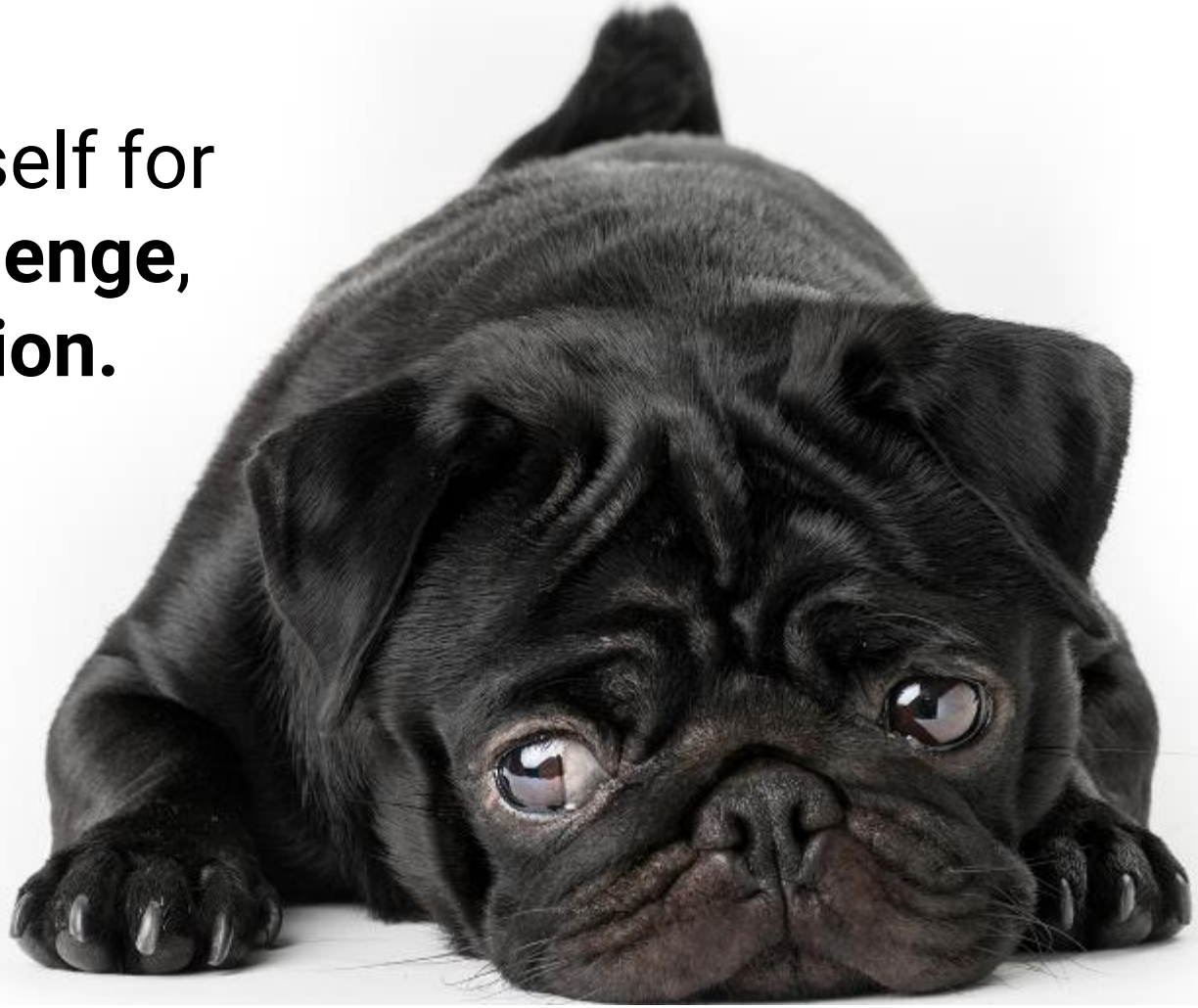
Interactive graph: Billboard hits vs. hair length (or albums released)



# Helpful Tips


Embrace your
inner toddler.

Brace yourself for **doubt**, **challenge**, and **confusion.**



Relish the **novice experience** and expect a lot of **lightbulb moments.**


Form a community
with your classmates.

There is no shortcut.
You've got to **put in the hours!**

# Celebrate your successes!

# Group Activity:

Form groups of 3 or 4 people. Get up from your seats and walk around. Don’t be shy!

**Suggested Time:**
5 minutes

# Take a Break!

# **Group Activity:**
# The Great Debate

Find your group you formed before the break. Together ponder the following question.

**Suggested Time:**
20 minutes

# Group Activity: The Great Debate

## Which do Americans prefer: Italian or Mexican food?

# Group Activity: The Great Debate

With your group, develop a strategy for answering this question with as much confidence possible. Specifically, answer questions like:

- What data will you attempt to gather?
- What relationships will you be looking for?
- How will you ensure your answer is most likely “true”?

## Assumptions:

You are given 5 hours and a budget of $10 to accomplish this.

Your answer will be tested by randomly selecting 9 Americans who will each be asked the question—with 0 qualifiers.

You only have your team.

**Suggested Time:** 20 minutes

# The Great Debate (Analyzed)

# Step 1: Decompose the Question

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Which do **Americans** prefer:
Italian or Mexican food?

# Step 1: Decompose the Question

## Which do **Americans** prefer: Italian or Mexican food?

- Who exactly is an **American**?
- Are **Americans** just homeowners?
- Do **Americans** just live in big cities?
- Are **Americans** just millennials?

How can we get a representative sample of Americans?

# Step 1: Decompose the Question

Which do Americans **prefer**:
Italian or Mexican food?

# Step 1: Decompose the Question

## Which do Americans **prefer**: Italian or Mexican food?

- How do we define “preference”?
- Do people prefer the foods they eat most frequently?
- Do people prefer the foods they wish they could eat if cost was not an issue?
- How uniform is the preference? Is it regionalized? Is it different by demographic?

Inherently, preference is **subjective**. We are going to need to make it **objective**.

# Step 1: Decompose the Question

Which do Americans prefer:
**Italian or Mexican food**?

# Step 1: Decompose the Question

Which do Americans prefer: **Italian or Mexican food**?

01

How do we categorize foods? Is pizza Italian? Is Taco Bell Mexican?

02

How do we categorize food? Does making pasta at home constitute Italian? Or are we just talking about restaurants?

03

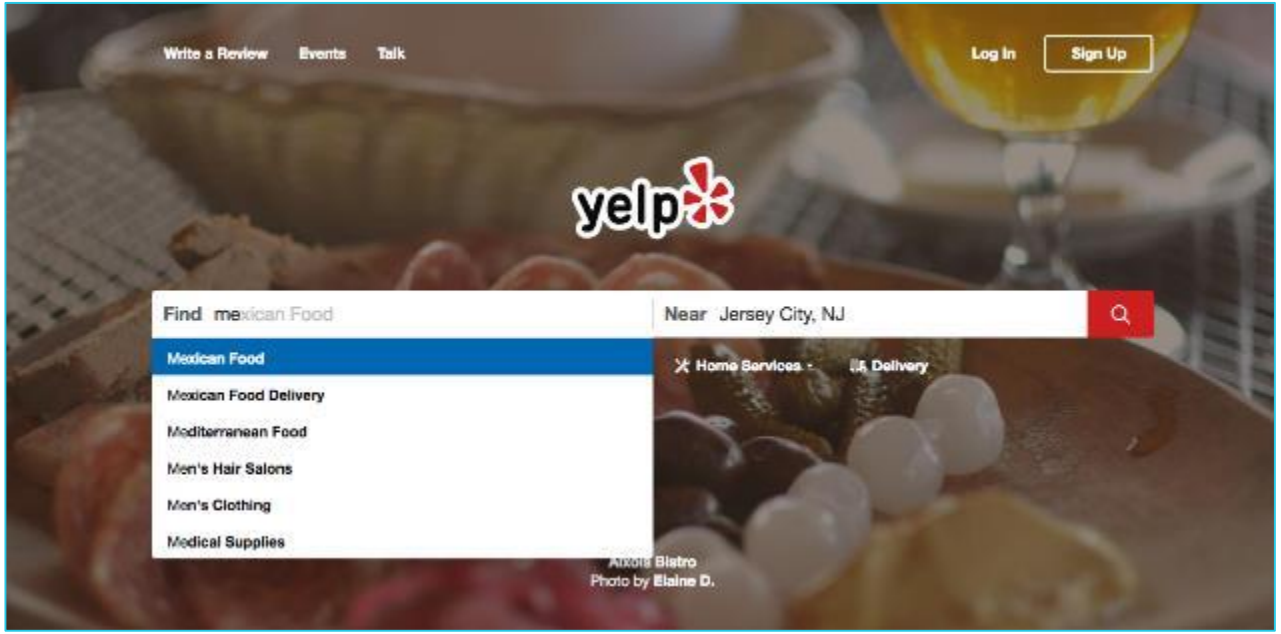
Are we just talking about “best experiences”? Or are we including poorer renditions of these foods?

Italian and Mexican are **broad categories** we are pursuing. We will have to narrow the scope.

# Step 2: Identify Data Sources

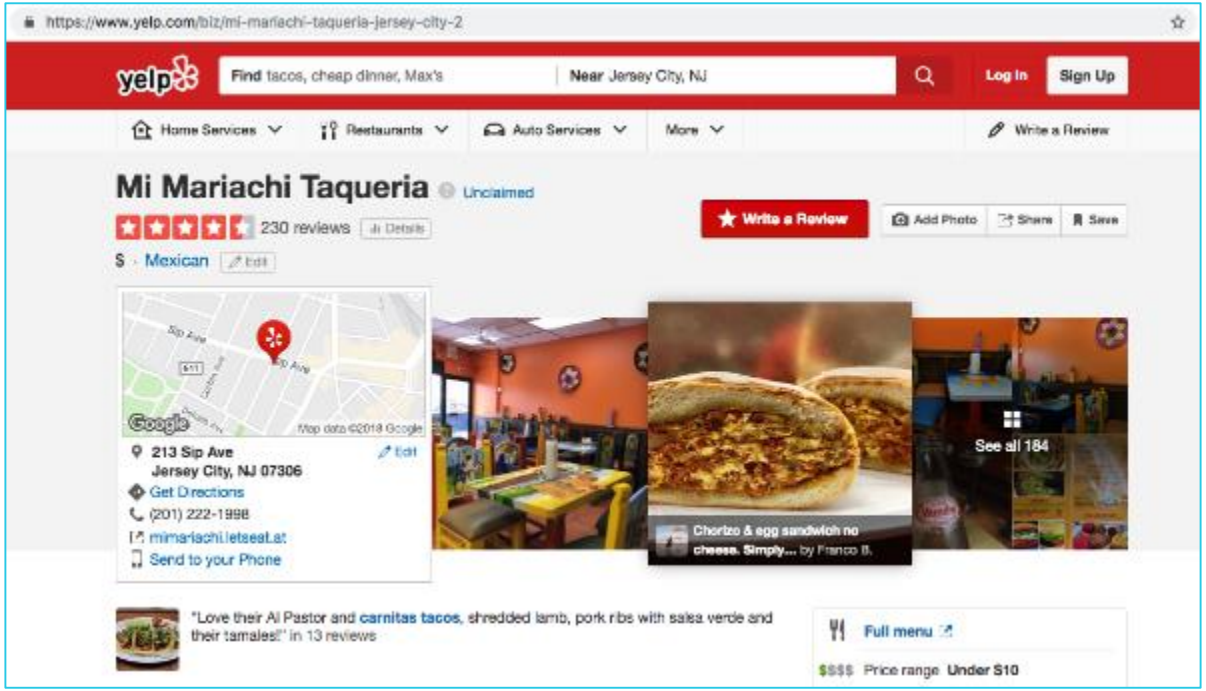
# Step 2: Identify Data Sources

As everyday consumers, we are **regularly** getting a pulse of everyday American food preferences to inform our own decisions. Perhaps we can make use of the same approach.



# Step 2: Identify Data Sources

Web services like Yelp provide an almost encyclopedic amount of information about the eating preferences of Americans.



# Step 2: Identify Data Sources

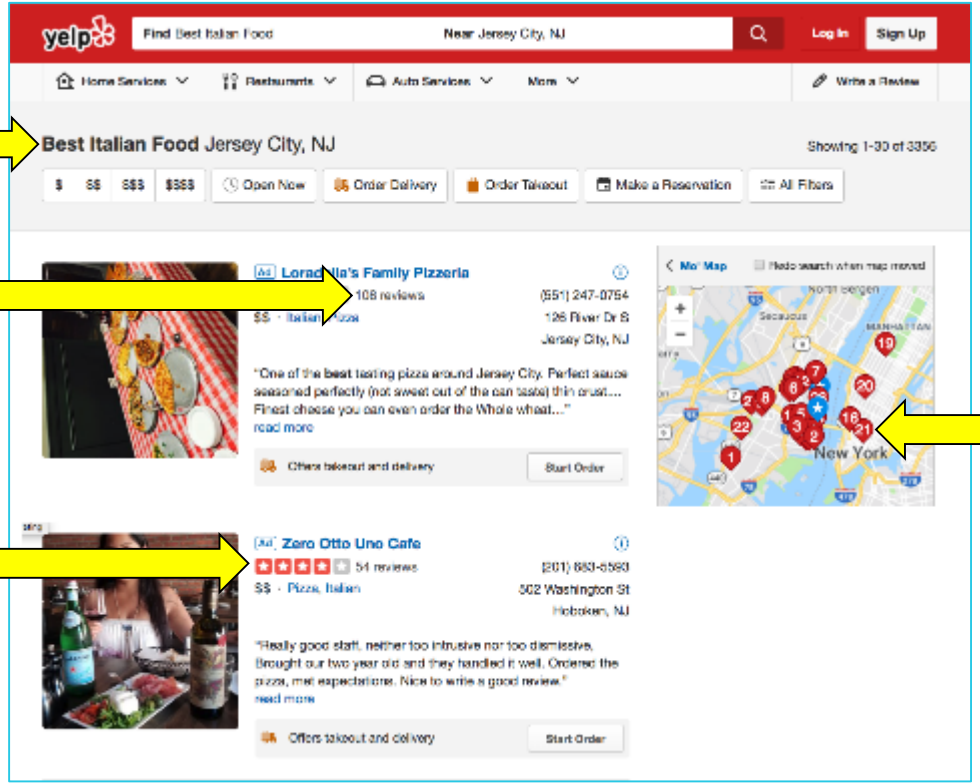
Why poll an audience when there already exist enormous databases of information about Americans' food preferences—readily available online?

# Step 2: Identify Data Sources

**Food Type**

**Review Count**

**Rating**




**Locations**

**Lots of Data!**

# Step 3: Define Strategy and Metrics

# Step 3: Define Strategy and Metrics

Here we created a blueprint for what we're targeting:

**Americans:**

- Ideally, we need thousands of records from Americans in hundreds of different cities. (Large samples)

**Preference:**

- Number of Yelp Reviews (More = Preference)
- Average Aggregated Ratings  (Higher = Preference)

**Italian and Mexican Food:**

- Top 20 Italian and Mexican restaurants in every city

# Step 3: Define Strategy and Metrics

Repeat this analysis for as many cities as possible.

| New York, NY | |
|---|---|
| **Italian** | **Mexican** |
| Restaurant | Restaurant |
| Restaurant | Restaurant |
| Restaurant | Restaurant |
| Restaurant | Restaurant |
| Restaurant | Restaurant |

VS.

| Tucson, AZ | |
|---|---|
| **Italian** | **Mexican** |
| Restaurant | Restaurant |
| Restaurant | Restaurant |
| Restaurant | Restaurant |
| Restaurant | Restaurant |
| Restaurant | Restaurant |

VS.

| Washington, D.C. | |
|---|---|
| **Italian** | **Mexican** |
| Restaurant | Restaurant |
| Restaurant | Restaurant |
| Restaurant | Restaurant |
| Restaurant | Restaurant |
| Restaurant | Restaurant |

VS.

| Omaha, NE | |
|---|---|
| **Italian** | **Mexican** |
| Restaurant | Restaurant |
| Restaurant | Restaurant |
| Restaurant | Restaurant |
| Restaurant | Restaurant |
| Restaurant | Restaurant |

VS.

| San Diego, CA | |
|---|---|
| **Italian** | **Mexican** |
| Restaurant | Restaurant |
| Restaurant | Restaurant |
| Restaurant | Restaurant |
| Restaurant | Restaurant |
| Restaurant | Restaurant |

VS.

| Atlanta, GA | |
|---|---|
| **Italian** | **Mexican** |
| Restaurant | Restaurant |
| Restaurant | Restaurant |
| Restaurant | Restaurant |
| Restaurant | Restaurant |
| Restaurant | Restaurant |

VS.

# Step 4: Build Data Retrieval Plan

# Step 4: Build Data Retrieval Plan

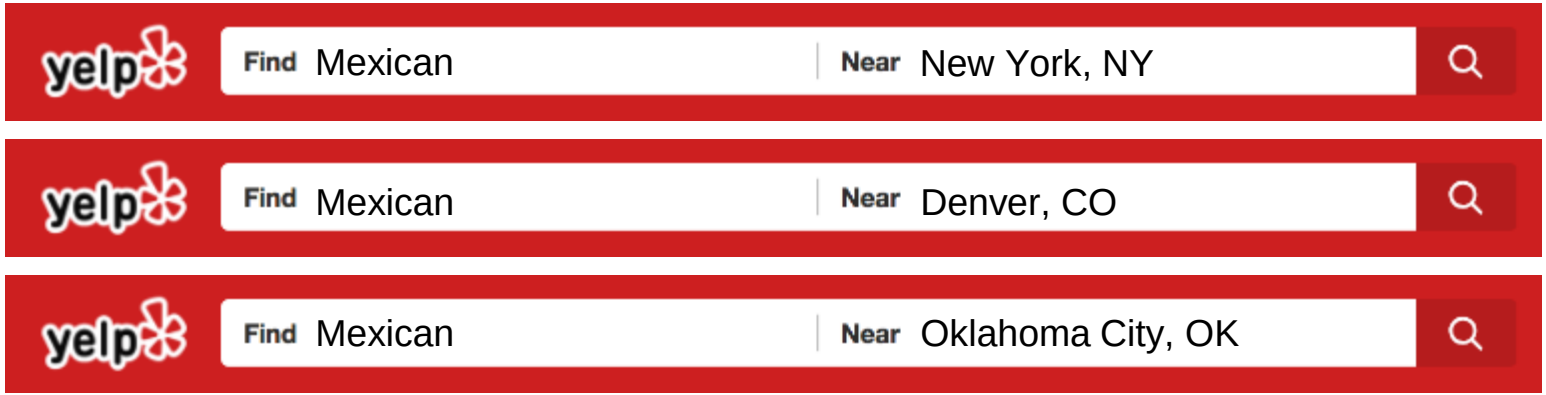
We could retrieve this data by brute force, but it would be:

- Extremely time consuming
- Skewed by our city familiarity
- Labor intensive



# Step 4: Build Data Retrieval Plan

Basically, it would be nearly impossible.



# Thank You, Yelp!

Thankfully, we can take advantage of the Yelp Fusion API to programmatically run our queries. (#ThankGoodnessForProgramming)

yelp Fusion Fusion API GraphQL Manage App

**General**

- Create App
- Email / Notifications
- Display Requirements
- Terms of Use
- FAQ

**Yelp Fusion**

- Introduction
- Business Endpoints
  - Business Search
  - Phone Search

## /businesses/search

This endpoint returns up to 1000 businesses based on the provided search criteria. It has some basic information about the business. To get detailed information and reviews, please use the Business ID returned here and refer to /businesses/{id} and /businesses/{id}/reviews endpoints.

Note: at this time, the API does not return businesses without any reviews.

### Request

```
GET https://api.yelp.com/v3/businesses/search
```

### Parameters

These parameters should be in the query string.

| Name | Type | Description |
|---|---|---|
| term | string | Optional. Search term, for example "food" or "restaurants". The term may also be business names, such as "Starbucks". If term is not included the endpoint will default to searching across businesses from a small number of popular categories. |
| location | string | Required if either latitude or longitude is not provided. This string indicates the geographic area to be used when searching for businesses. Examples: "New York City", "NYC", "350 5th Ave, New York, NY 10118". Businesses returned in the response may not be strictly within the specified location. |

# Thank You, Yelp!

**Response Body**


```
{
  "total": 8228,
  "businesses": [
    {
      "rating": 4,
      "price": "$",
      "phone": "+14152520800",
      "id": "four-barrel-coffee-san-francisco",
      "is_closed": false,
      "categories": [
        {
          "alias": "coffee",
          "title": "Coffee & Tea"
        }
      ],
      "review_count": 1738,
      "name": "Four Barrel Coffee",
      "url": "https://www.yelp.com/biz/four-barrel-coffee-san-francisco",
      "coordinates": {
        "latitude": 37.7670169511878,
        "longitude": -122.42184275
      },
      "image_url": "http://s3-media2.fl.yelpcdn.com/bphoto/MmgtASP3l_t4tPCL1iAsCg/o.jpg",
      "location": {
        "city": "San Francisco",
        "country": "US",
        "address2": "",
        "address3": "",
        "state": "CA",
        "address1": "375 Valencia St",
        "zip_code": "94103"
      },
      "distance": 1604.23,
      "transactions": ["pickup", "delivery"]
    },
    // ...
  ],
  "region": {
    "center": {
      "latitude": 37.767413217936834,
      "longitude": -122.42820739746094
    }
  }
}
```


yelp Fusion


```
  ],
  "review_count": 1738,
  "name": "Four Barrel Coffee",
  "url": "https://www.yelp.com/biz/four-barrel-coffee-san-francisco",
  "coordinates": {
    "latitude": 37.7670169511878,
    "longitude": -122.42184275
  },
  "image_url": "http://s3-media2.fl.yelpcdn.com/bphoto/MmgtASP3l_t4tPCL1iAsCg/o.jpg",
```

# Step 4: Build Data Retrieval Plan

We will build a Python script to randomly select over 700 zip codes from the U.S. Census, and then acquire review data from the top 20 Mexican and Italian restaurants for each zip code using the Yelp API.

| 11101 | |
|---|---|
| **Italian** | **Mexican** |
| Restaurant | Restaurant |
| Restaurant | Restaurant |
| Restaurant | Restaurant |
| Restaurant | Restaurant |
| Restaurant | Restaurant |

| 07360 | |
|---|---|
| **Italian** | **Mexican** |
| Restaurant | Restaurant |
| Restaurant | Restaurant |
| Restaurant | Restaurant |
| Restaurant | Restaurant |
| Restaurant | Restaurant |

| 20001 | |
|---|---|
| **Italian** | **Mexican** |
| Restaurant | Restaurant |
| Restaurant | Restaurant |
| Restaurant | Restaurant |
| Restaurant | Restaurant |
| Restaurant | Restaurant |

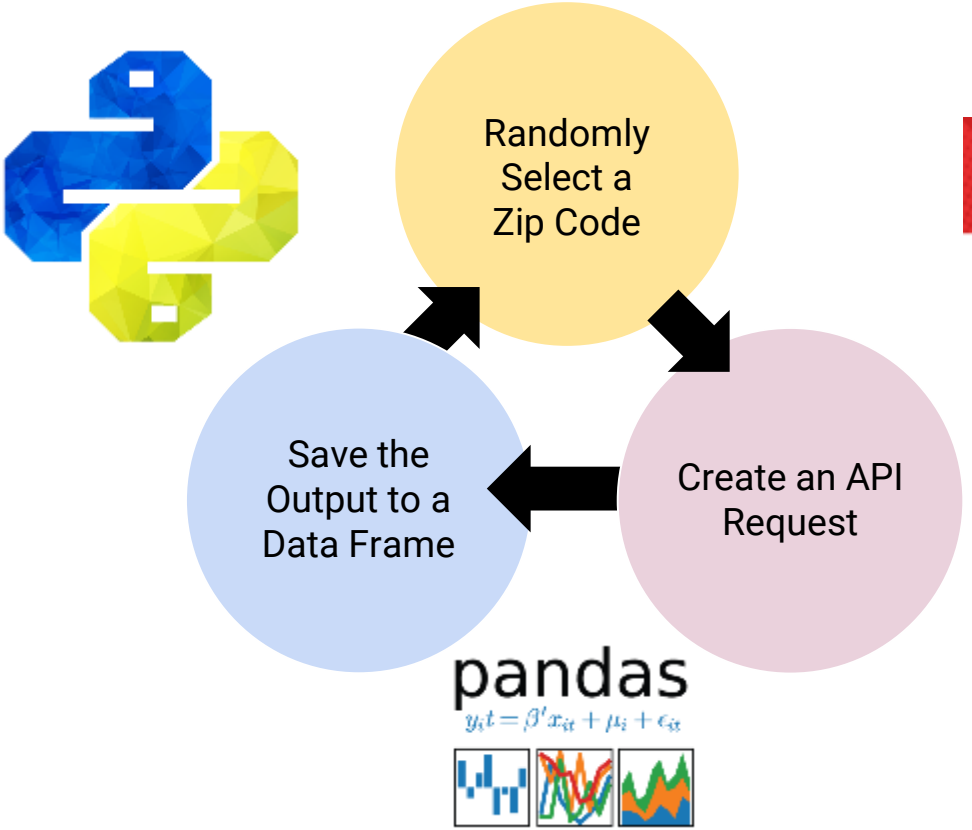
| 68007 | |
|---|---|
| **Italian** | **Mexican** |
| Restaurant | Restaurant |
| Restaurant | Restaurant |
| Restaurant | Restaurant |
| Restaurant | Restaurant |
| Restaurant | Restaurant |

| 22434 | |
|---|---|
| **Italian** | **Mexican** |
| Restaurant | Restaurant |
| Restaurant | Restaurant |
| Restaurant | Restaurant |
| Restaurant | Restaurant |
| Restaurant | Restaurant |

| 30301 | |
|---|---|
| **Italian** | **Mexican** |
| Restaurant | Restaurant |
| Restaurant | Restaurant |
| Restaurant | Restaurant |
| Restaurant | Restaurant |
| Restaurant | Restaurant |

# Step 5: Retrieve the Data

# Pulling with Python




yelp Fusion

# Pulling with Python

```python
# Use Try-Except to handle errors
try:

    # Loop through all records to calculate the review count and weighted review value
    for business in yelp_reviews_italian["businesses"]:

        italian_review_count = italian_review_count + business["review_count"]
        italian_weighted_review = italian_weighted_review + business["review_count"] * business["rating"]

    for business in yelp_reviews_mexican["businesses"]:
        mexican_review_count = mexican_review_count + business["review_count"]
        mexican_weighted_review = mexican_weighted_review + business["review_count"] * business["rating"]

    # Append the data to the appropriate column of the data frames
    italian_data.set_value(index, "Zip Code", row["Zipcode"])
    italian_data.set_value(index, "Italian Review Count", italian_review_count)
    italian_data.set_value(index, "Italian Average Rating", italian_weighted_review / italian_review_count)
    italian_data.set_value(index, "Italian Weighted Rating", italian_weighted_review)

    mexican_data.set_value(index, "Zip Code", row["Zipcode"])
    mexican_data.set_value(index, "Mexican Review Count", mexican_review_count)
    mexican_data.set_value(index, "Mexican Average Rating", mexican_weighted_review / mexican_review_count)
    mexican_data.set_value(index, "Mexican Weighted Rating", mexican_weighted_review)

except:
    print("Uh oh")
```

**This funky code...**

# Pulling with Python

```
1
https://api.yelp.com/v3/businesses/search?term=Italian&location=76556
https://api.yelp.com/v3/businesses/search?term=Mexican&location=76556
2
https://api.yelp.com/v3/businesses/search?term=Italian&location=72039
https://api.yelp.com/v3/businesses/search?term=Mexican&location=72039
3
https://api.yelp.com/v3/businesses/search?term=Italian&location=61606
https://api.yelp.com/v3/businesses/search?term=Mexican&location=61606
4
https://api.yelp.com/v3/businesses/search?term=Italian&location=47232
https://api.yelp.com/v3/businesses/search?term=Mexican&location=47232
5
https://api.yelp.com/v3/businesses/search?term=Italian&location=60565
https://api.yelp.com/v3/businesses/search?term=Mexican&location=60565
6
https://api.yelp.com/v3/businesses/search?term=Italian&location=20634
https://api.yelp.com/v3/businesses/search?term=Mexican&location=20634
7
https://api.yelp.com/v3/businesses/search?term=Italian&location=71046
https://api.yelp.com/v3/businesses/search?term=Mexican&location=71046
```

**...will make all of these URLs.**

# Pulling with Python

GET https://api.yelp.com/v3/businesses/search?term=italian&location=37784... Params Send Save

Authorization Headers (1) Body Pre-request Script Tests Code

| Key | Value | Description |
| --- | --- | --- |
| Authorization | Bearer gl6k6jmewUhzjMVBv0I2x4Bz_NRiEgg5qJGbTaeymbzvBJXgI36F... | |
| New key | Value | Description |

Bulk Edit Presets

Body Cookies Headers (10) Tests Status: 200 OK Time: 663 ms

Pretty Raw Preview JSON


```
{
    "businesses": [
        {
            "id": "two-brothers-italian-pizza-kodak",
            "name": "Two Brothers  Italian Pizza",
            "image_url": "https://s3-media3.fl.yelpcdn.com/bphoto/364BqQtOqtVHV1f0t_xznA/o.jpg",
            "is_closed": false,
            "url": "https://www.yelp.com/biz/two-brothers-italian-pizza-kodak?adjust_creative=1GwZyE0zIj5ujpHtlNnodQ&utm_campaign=yelp_api_v3&utm_medium
                =api_v3_business_search&utm_source=1GwZyE0zIj5ujpHtlNnodQ",
            "review_count": 8,
            "categories": [
                {
                    "alias": "pizza",
                    "title": "Pizza"
                },
                {
                    "alias": "italian",
                    "title": "Italian"
                },
                {
                    "alias": "pastashops",
                    "title": "Pasta Shops"
                }
            ],
            "rating": 2,
            "coordinates":
                "latitude": 35.9630862447754,
                "longitude": -83.5028628147413
            },
            "transactions": [],
            "location": {
```


**Each of these URLs holds a piece of our answer.**

# Step 6: Assemble and Clean the Data

# Cleaning with Pandas

No data comes out intrinsically the way you want it to.
In our case, we needed multiple steps to aggregate the data along our channels of interest.

```
# Combine DataFrames into a single DataFrame
combined_data = pd.merge(mexican_data, italian_data, on="Zip Code")
combined_data.head( )
```

| | Zip Code | Mexican Review Count | Mexican Average Rating | Mexican Weighted Rating | Italian Review Count | Italian Average Rating | Italian Weighted Rating |
|---|---|---|---|---|---|---|---|
| **0** | 76556 | 97 | 4.1134 | 399 | 63 | 3.78571 | 238.5 |
| **1** | 72039 | 256 | 4.11133 | 1052.2 | 266 | 3.81955 | 1016 |
| **2** | 61606 | 378 | 3.64286 | 1377 | 66 | 3.2197 | 212.5 |
| **3** | 47232 | 222 | 4.16892 | 925.5 | 420 | 3.77857 | 1587 |
| **4** | 60565 | 2842 | 3.94053 | 11199 | 2829 | 3.92824 | 11113 |

# Step 7: Analyze for Trends

# Analyze for Trends (Table)

## It’s Close:

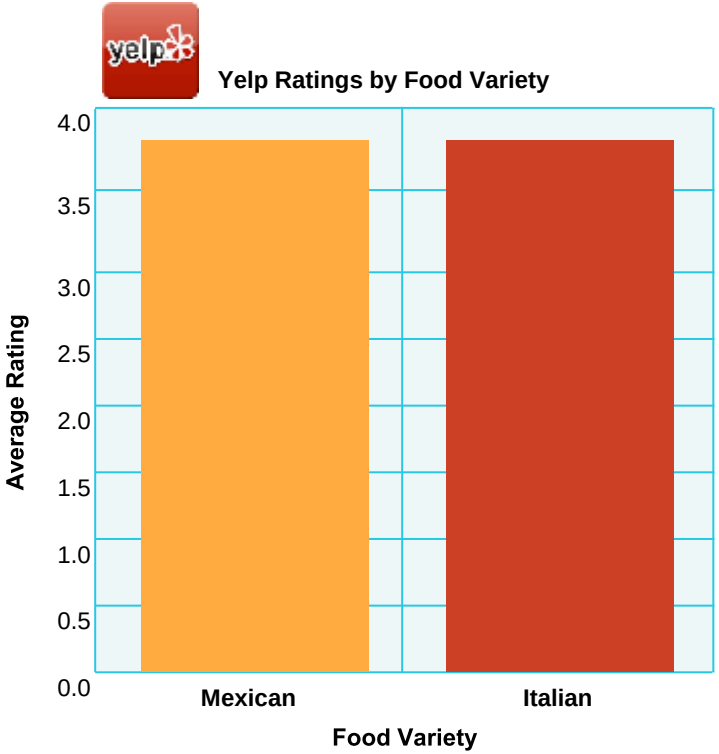
### Display Summary of Results

```
# Model 1: Head-to-Head Review Counts
italian_summary = pd.DataFrame({"Review Counts": italian_data["Italian Review Count"].sum(),
                                "Rating Average": italian_data["Italian Average Rating"].mean(),
                                "Review Count Wins": combined_data["Review Count Wins"].value_counts()["Italian"],
                                "Rating Wins": combined_data["Rating Wins"].value_counts()["Italian"]}, index=["Itali

mexican_summary = pd.DataFrame({"Review Counts": mexican_data["Mexican Review Count"].sum(),
                                "Rating Average": mexican_data["Mexican Average Rating"].mean(),
                                "Review Count Wins": combined_data["Review Count Wins"].value_counts()["Mexican"],
                                "Rating Wins": combined_data["Rating Wins"].value_counts()["Mexican"]}, index=["Mexic

final_summary = pd.concat([mexican_summary, italian_summary])
final_summary
```

| | Rating Average | Rating Wins | Review Count Wins | Review Counts |
|---|---|---|---|---|
| Mexican | 3.826588 | 273 | 220 | 476889 |
| Italian | 3.806869 | 245 | 298 | 573733 |

# Analyze for Trends (Ratings)

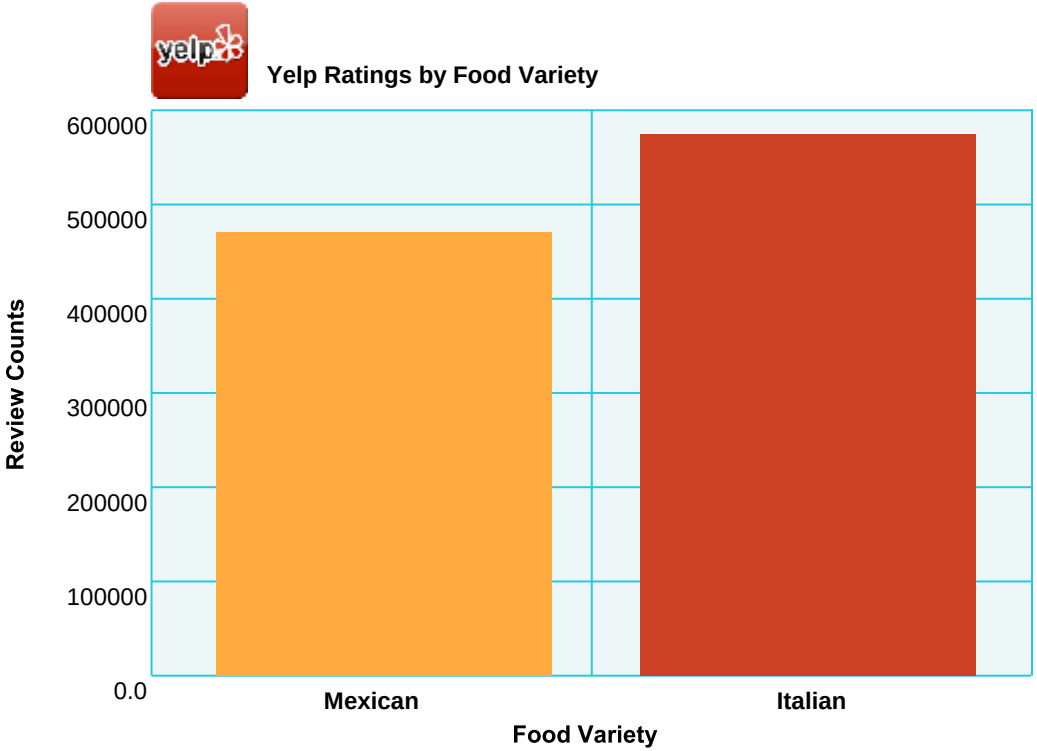
Yelpers rate Italian and Mexican relatively **equally**.




=

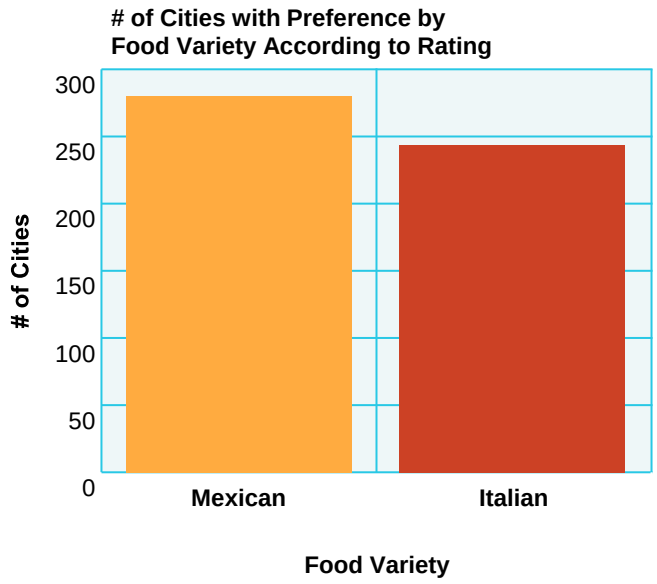
# Analyze for Trends (Ratings)

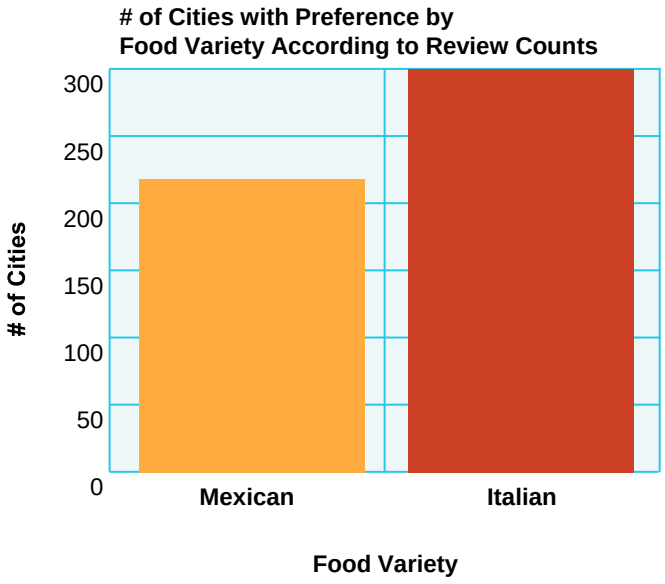
Yelpers seem to significantly **review more Italian** restaurants.



# Analyze for Trends (Winner Take All)

Just for kicks, let's throw in an analysis that aggregates the data from all cities using a winner-take-all approach.
**It's sort of a wash**.



# Analyze for Trends (Statistical Analysis)

Because of how close the numbers appear, we utilized a Student's t-test to quickly assess if the perceived differences are not statistically significant but could be considered substantial.

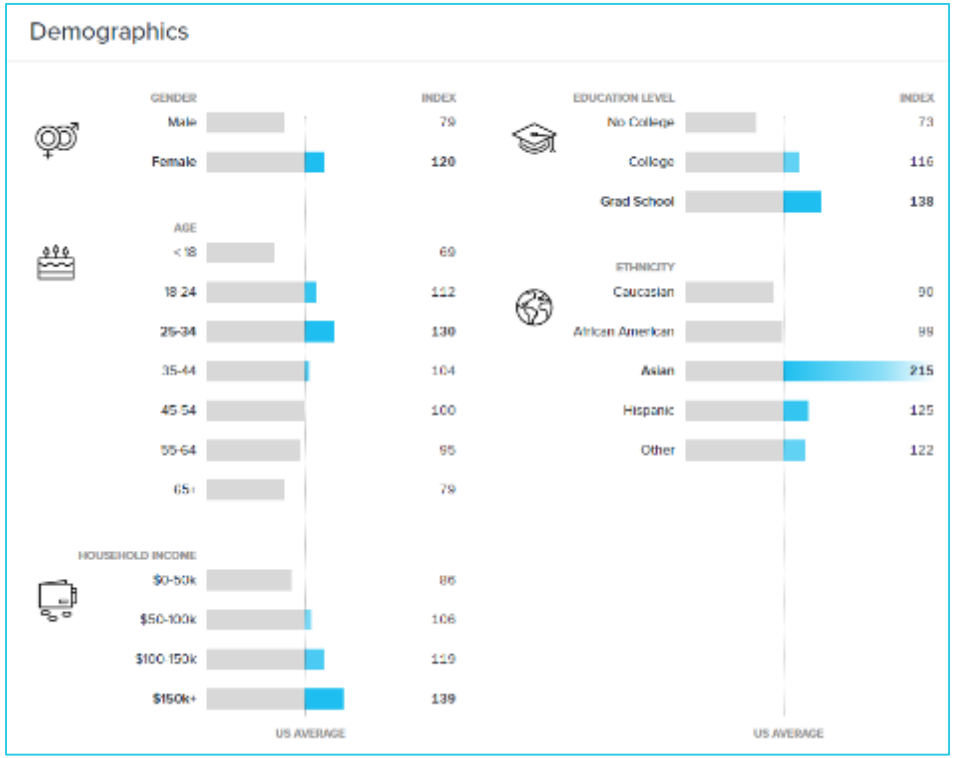
| Metric | Italian | Mexican | p-Value (t-test) |
|---|---|---|---|
| Average Rating | 3.806 | 3.826 | 0.284 |
| Review Counts | 573k | 476k | 0.057 |

The difference in review count is **not statistically significant**.

# Step 8: Acknowledge Limitations

# Limitations of Analysis

Yelp demographics may not match the American demographic.



# Limitations of Analysis

Restaurant experiences do not equate to home-cooked meals.

# Limitations of Analysis

Fine-dining effect?

# Step 9: Make the Call

# Making the Call

**The “Proper” Conclusion:**
Based on our analysis, it’s clear that Americans’ preferences for Italian and Mexican food are similar in nature. As a whole, Americans rate Mexican and Italian restaurants at non-statistically similar scores (avg. score: 3.8, p-value: 0.285). Although there are more reviews for Italian restaurants, we have shown that the difference isn’t statistically significant (+96k, p-value: 0.057).

This may indicate there is an increased interest in visiting Italian restaurants at an experiential level. Or it may merely suggest that Yelp users enjoy writing reviews of Italian restaurants more than Mexican restaurants.

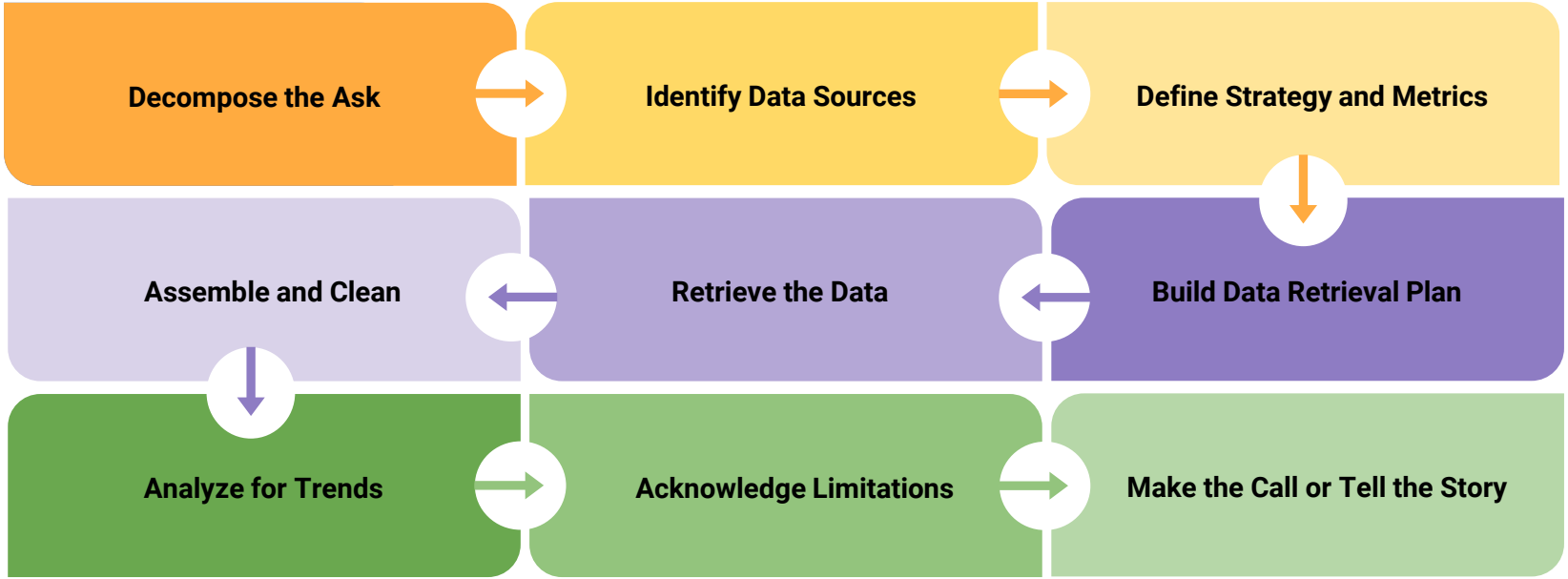
# Making the Call

The “Let’s Be Real” Conclusion: Italian (but it’s going to be close).

# An Analytics Paradigm

# Analytics Paradigm

Regardless of type or industry, this paradigm provides a repeatable pathway for effective data problem solving.



# **Group Activity:**
# Predicting Gentrification

Using the Analytics Paradigm as a framework, outline a strategy by which you would identify which neighborhoods in our city are seeing signs of gentrification.

**Suggested Time:**
15 minutes

# Group Activity: Predicting Gentrification

## Specifically, how would you answer these questions:

- What observable signs can we detect to suggest gentrification is happening?
- What means can we use to determine how long the trend has been happening?
- What proxies might we use to identify gentrification in non-obvious ways?
- How might you create a visualization of this data to best “tell the story”?

## Pay special attention to details like:

- What data will you use to build your model?
- How will you retrieve the data?
- What does your final “story” look like?

Suggested Time: 13 minutes

# Time’s Up! Let’s Review.

# **Homework:**
Kickstart My Chart

# Prepare for Next Class

By Next Class:

01 Make certain that you have **Microsoft Excel** installed.

02 Make certain that you have **Slack** installed and are actively looking at it.

03 Figure out where the **Git** repository for our class is.

04 Figure out where class videos will be posted. Hint: it's **BCS**.

# Questions?